Space Weather Forecast

Issued on Saturday 4 January 2025 at 01:17 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate class flares likely, with an increased chance of Strong class flares. Chance G1 Minor Geomagnetic Storms Days 1-2 (04-05 Jan).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity increased to High levels with a Strong flare observed at 03/1139 UTC and another Strong flare observed at 03/2241UTC, both flares from sunspot AR3947 in the northeast disk. This region also looks responsible for a Moderate flare at 03/2356 UTC.

There are fourteen sunspot regions on the Earth-facing disc, with AR3949 now attributed to a small bipolar region in the southwest, AR3935 disappeared from view towards the west limb and a new unnumbered region rounding the southeast limb. Despite the large number of spots on the facing-disc, many are small and magnetically simple. Of the more notable regions, AR3947, responsible for the recent flare activity, continues to develop. Some slight decay of a number of sunspots has taken place, otherwise there has been little change to the remaining regions on the facing-disc.

The Coronal Mass Ejection (CME) associated with the Strong flare observed at 03/1139 UTC has been assessed as non-Earth directed. Further CMEs associated with the recent flaring from the same region will be analysed as they appear in coronagraph imagery, with ejecta clearly associated with the most recent Strong flare in imagery.

Solar Wind / Geomagnetic Activity: Solar winds have shown a generally steady decline from 460km/s towards 400km/s in the period, but with a recent uptick to 430km/s. The Interplanetary Magnetic Field, Bt, has been largely moderate. The north-south component, Bz, persistently weak to moderately positive though much of the period.

Geomagnetic activity at Quiet to Unsettled levels.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background levels with no Solar Radiation Storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Activity is forecast to be Moderate to High, with isolated Moderate flares considered likely and a chance of further isolated strong flares. This risk increased given recent activity from sunspot region AR3947.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

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Solar Wind / Geomagnetic Activity: There is one potential Earth directed CME, which is expected to pass near Earth early on Day 1 (04 Jan), perhaps already being experienced. The onset of faster solar wind expected during the later half of Day 1 (04 Jan) or into Day 2 (05 Jan). Elevated solar winds of 500-600km/s are likely, declining only slowly into Days 3 and 4 (06-07 Jan).

Geomagnetic activity is expected to be Quiet to Unsettled initially, with a chance of Active intervals and a slight chance of a G1 Minor geomagnetic storm early on Day 1 (04 Jan) in association with glancing CME arrival. Unsettled to Active conditions are then expected with a chance G1 Minor geomagnetic storm intervals during the later half of Day 1 (04 Jan) or into Day 2 (05 Jan) with faster solar wind onset. Activity is forecast to subside to generally Quiet to Unsettled levels into Days 3 and 4 (06-07 Jan).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is likely to continue at background levels, but with a slight chance of exceeding the S1/Minor Storm threshold.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	30	5	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	70	70	70	70
Very Active	R3-R5 (X Class)	Yes	25	25	25	25

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	10	10	10	10
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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